

Discovery of plant protein holds promise for biofuel production

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Scientists at Michigan State University have identified a new protein necessary for chloroplast development. The discovery could ultimately lead to plant varieties tailored specifically for biofuel production.

Chloroplasts, which are specialized compartments in plant cells, convert sunlight, carbon dioxide and water into sugars and oxygen ("fuel" for the plant) during photosynthesis. The newly discovered protein, trigalactosyldiacylglycerol 4, or TGD4, offers insight into how the process works.

"Nobody knew how this mechanism worked before we described this protein," said Christoph Benning, MSU professor of biochemistry and molecular biology. "This protein directly affects photosynthesis and how plants create biomass (stems, leaves and stalks) and oils."

Benning also is a member of the Great Lakes Bioenergy Research Center, a partnership between MSU and the University of Wisconsin-Madison funded by the U.S. Department of Energy to conduct basic research aimed at solving some of the most complex problems in converting natural materials to energy.

The research, published in the August 2008 issue of journal *The Plant Cell*, shows how TGD4 is essential for the plant to make chloroplasts. Plants that don't have the protein die before they can develop beyond the embryonic stage.

Understanding how TGD4 works may allow scientists to create plants that would be used exclusively to produce biofuels, possibly making the process more cost-effective. Most plants that are used to produce oils – corn, soybeans and canola, for example – accumulate the oil in their seeds.

"We've found that if the TGD4 protein is malfunctioning, the plant then accumulates oil in its leaves," Benning said. "If the plant is storing oil in its leaves, there could be more oil per plant, which could make production of biofuels such as biodiesel more efficient. More research is needed so we can completely understand the mechanism of operation."

Source: Michigan State University

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